SUPERFUND PROPOSED PLAN

Aqua-Tech Environmental Site
Greer, Spartanburg County, South Carolina

EPA Region 4 Fact Sheet

EPA ANNOUNCES PROPOSED ACTION

The Region 4 Office of the United States Environmental Protection Agency (EPA) has developed this **Proposed Plan** to inform citizens and local officials of the **Preferred Alternative** for cleaning up contaminated soil and ground water at the Aqua-Tech Environmental Site and the rationale for this preference. In addition, this Plan includes summaries of other cleanup alternatives evaluated for use at this site.

EPA, the lead agency for site activities, and the South Carolina Department of Health & Environmental Control (SCDHEC), will select a final remedy for the site after reviewing and considering all information submitted during the 30-day public comment period. EPA, in consultation with SCDHEC, may modify the Preferred Alternative or select another response action presented in this Plan based on new information or public comments. Therefore, the public is encouraged to review and comment on all the alternatives presented in this Proposed Plan.

EPA is issuing this Proposed Plan as part of its public participation responsibilities under Section 117(A) of the **Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)** of 1980, as amended by the **Superfund Amendments and Reauthorization Act (SARA)** of 1986, and Section 300.430(f)(2) of the **National Oil and Hazardous Substances Pollution Contingency Plan (NCP)**. This Proposed Plan summarizes information that can be found in greater detail in the **Remedial Investigation/Feasibility Study (RI/FS)** reports and other technical documents in the **Administrative Record** file for this site. This plan summarizes key information from the Administrative Record. EPA and SCDHEC encourage the public to review these documents to gain a more comprehensive understanding of the site and Superfund activities that have been conducted at the site.

For more information regarding the Administrative Record for the Aqua-Tech Environmental Site, refer to the information repositories listed on page **17.**

Terms that appear in **bold** throughout the text are defined in the glossary at the end of this publication.

IMPORTANT DATES

EPA's Proposed Cleanup Plan
Public Comment Period:
July 27, 2003 - Aug 25, 2003

Availability Session
Tuesday, August 5, 2003
4:00 p.m. - 6:00 p.m.
Middle Tyger Community Center
84 Groce Road, Lyman, SC

Public Meeting
Tuesday, August 5, 2003
the meeting will begin at 7:00 p.m.
Middle Tyger Community Center
84 Groce Road, Lyman, SC

SITE BACKGROUND

The Aqua-Tech Environmental Site (the "Site") is located on Robinson Road near its intersection with South Carolina Highway 290, approximately 3 miles east of the City of Greer and approximately 1 mile west of the City of Duncan, South Carolina (refer to Figure 1 at the end of this publication).

The Site consists of 61.56 acres of land. A former **Resource Conservation and Recovery Act (RCRA)** hazardous waste treatment and storage facility was located on approximately 20 acres of the Site. A closed municipal solid waste landfill (MSWL) is present on approximately 10 acres within this 20-acre area. The primary operating areas that comprise the RCRA Facility and the closed MSWL are illustrated on Figure 2.

The Site is presently abandoned and the land surrounding the Site is generally wooded, with the closest residences located approximately 650 feet to the east. There are several small businesses to the north of the Site on SC Highway 290. An auto salvage dealer (junkyard) previously was located immediately north of the Site. Automobiles and other materials stored in the junkyard were removed by that property owner. The area west of the Site is former farmland. The area south of the Site is wooded and contains a sanitary sewer line. The nearest surface water body is Maple Creek, which is located on the southern boundary of the facility. Maple Creek flows to the east into the South Tyger River which is approximately 3000 feet downstream of the Site.

The Site is zoned as commercial/industrial and is located within the "Airport Environs Area" as defined by the *Greenville - Spartanburg Airport Environs Area zoning Ordinance, dated March 29, 1996*. This zoning ordinance precludes future residential development use of the Site. There are several residences to the east of the Site on Robinson Road and to the north of the Site on SC Highway 290. There are several residential neighborhoods consisting of a few houses each within a 1-mile radius of the Site.

SITE HISTORY\PREVIOUS INVESTIGATIONS

Prior to the 1940's, activities at the Site are unknown. The Site was used for waste management activities as early as the 1940's when local residents used the property for general dumping. It is unknown who owned the Site before the 1950's or 1960's when the City of Greer purchased 35 acres of land. From 1963 until 1968, the City operated an MSWL covering approximately 10 acres of the Site. The MSWL was subsequently closed and capped with clay in the early 1970's.

In December 1974, Groce Laboratories, Incorporated (GLI) purchased the 35 acres from the City of Greer and began operating a hazardous waste treatment, storage, and reclamation facility over the MSWL area. From the mid-1970's until 1987, site operations consisted of hazardous waste treatment, recycling, reclamation and storage activities. Aqua-Tech Environmental, Inc. (Aqua-Tech) purchased the operations in April 1987 and continued to accept, store, and treat most hazardous wastes as well as a variety of other solid wastes. These wastes included explosives, laboratory pack materials, cyanides, water reactives, oxidizers, acids and bases, fuels and gas cylinders. Most of the waste arrived at the Site in drums or other containers, although some materials arrived by bulk tank truck. Both GLI and Aqua-Tech were regulated by RCRA.

On September 4, 1991, after several complaints, RCRA violations and on-site accidents, Aqua-Tech was ordered closed by SCDHEC due to the large volume of improperly stored hazardous waste and the imminent threat to public health. Upon closing Aqua-Tech, SCDHEC and EPA personnel discovered approximately 7,000 drums and lab packs, 97 above-ground tanks, 1,200 gas cylinders (some containing phosgene and other toxic gases), unexploded ordinance material, and small amounts of low-level radioactive material and biohazard material at the Site. Many of the drums, tanks, and cylinders were deteriorating, leaking and improperly stored. Prior to emergency stabilization activities, several investigations indicated significant contamination throughout the site including soils, drainage ditches,

surface water and ground water. The primary contaminants included metals (cadmium, chromium, cobalt, lead, mercury, nickel, and zinc), various **volatile organic compounds(VOCs)**, and **semi-volatile organic compounds (SVOCs)**. From September 1991 to January 1992, SCDHEC conducted emergency stabilization activities. On April 24, 1992, EPA issued a Unilateral Administrative Order to more than 90 **potentially responsible parties (PRPs)** requiring that they conduct necessary removal actions to "*abate an imminent and substantial endangerment to the public health, welfare, or the environment that may be presented by the actual or threatened release of hazardous substances from the Site*." On May 4, 1992, the PRPs assumed responsibility for the Site to properly manage and dispose of materials still remaining at the Site. During the removal action, treatment took place, as well as removing materials from the Site for disposal. The removal action was completed on November 9, 1993. On August 23, 1994, EPA proposed the Site for inclusion on the **National Priorities List (NPL).** Subsequently, the Site was listed on the NPL on December 16, 1994.

Although the removal of drums, cylinders and solid and liquid wastes reduced the potential for exposure to contaminated materials at the Site, additional investigation was required to further characterize the Site. On September 26, 1995, the Aqua-Tech PRP Group (PRP Group) signed an **Administrative Order of Consent (AOC)** with EPA agreeing to fully fund and conduct a **Remedial Investigation/Feasibility Study (RI/FS)** at the Site. The purpose of the RI/FS was to assess the nature and extent of soil and groundwater contamination; evaluate the potential risks to human health and the environment from site **environmental media**, and evaluate **cleanup** alternatives based on the potential impacts at the Site.

SUMMARY OF SITE CHARACTERISTICS

Due to access and enforcement issues, field sampling activities did not begin until May 1998. The RI/FS field work was conducted intermittently from May 1998 to December 2001 with oversight by EPA and SCDHEC. During the RI/FS field work, approximately 300 samples (groundwater, soil, surface water, sediment and landfill gas) were collected to characterize the Site (Figure 3).

Based on the data collected during the RI, the two potential contaminant sources currently on the Site are: the closed MSWL and soils impacted by the former Aqua-Tech operations.

The area of the closed MSWL is approximately 10.1 acres and the estimated volume of waste does not exceed 320,000 cubic yards. Based on the landfill gas samples, not all of this volume contains putrescible waste. The water table beneath the Site appears to intersect the waste. VOCs detected in landfill gas samples indicate the closed MSWL contains hazardous constituents mixed with municipal waste. Therefore, given these characteristics, the closed MSWL is and will continue to be a source of landfill gas and groundwater contamination over the long term.

The soil data collected during the various phases of the RI and following the removal action have indicated a limited number of areas with exceedances of health-based standards. The primary **chemicals of concern (COCs)** in surface soil are Lead and Mercury. The Primary COCs in subsurface soils are PCB 1242, Thallium and Trichloroethene. Most of these are located within the limits of the closed MSWL. A qualitative assessment of the contaminants from on-Site soils identified three areas of impact (501, 601-02 and the Process Distillation Area) where residual soil contamination represents a potential on-going source of groundwater degradation (Figure 2). The Process Distillation Area is the only area where contaminants extended through the soil column, to groundwater. Based on these characteristics, the limited impacted soil remaining on Site appears to be a secondary source of potential contamination.

The closed MSWL and the former Aqua-Tech operations have impacted surface soil, groundwater, and sediment in the east drainage ditch (Sedimentation Basin Area). However, the Site activities have not significantly impacted the surface water or sediment in Maple Creek.

Groundwater impact has occurred at the Site. The

primary COCs in the groundwater are 1,1,2,2 - Tetrachloroethane, 1,1- Dichloroethene, Benzene, cis-1,2-Dichloroethene, Tetrachloroethene, Trichloroethene and Vinyl Chloride. The available data indicate that Site related contaminants have not migrated south of Maple Creek.

Contaminant Fate and Transport

The evaluation of all available Site data identified four potentially significant migration pathways: landfill gas emissions to ambient air; leaching of contaminants from soil to groundwater; migration of groundwater to surface water; and, vapor transport from groundwater to indoor air.

- A landfill gas assessment was conducted to estimate maximum landfill gas emission rates and exposure point concentrations. Comparison of the predicted maximum emission rates to South Carolina's de minimis emission criteria showed that only benzene and vinyl chloride exceeded the criteria. Based on the results of the air dispersion model, the resulting 24 hour average concentrations are below **South Carolina Maximum Ambient Air Concentrations (MAACs)**. Therefore, landfill gas emissions do not pose a significant risk to on-Site or off-Site receptors.

- A qualitative assessment of the potential for leaching of contaminants from soil to groundwater identified a limited potential for groundwater impact. Residual soil primarily contaminated with VOCs is generally limited to the upper 4 feet of the soil horizon.

- The evaluation of groundwater migration to surface water has shown that the closure of the landfill, and the Removal Action has resulted in the general decline of contaminant concentrations in the groundwater across the Site. Groundwater discharges to Maple Creek over most of the Site. However, this discharge of groundwater to Maple Creek has not resulted in an unacceptable impact on the surface water quality and is not expected to impact surface water quality.

- An evaluation of the potential migration of VOC vapors from the groundwater to indoor air was undertaken for the former Administration Area. This evaluation used the an air modeling program, and assumed conservatively future residential development even though such development is currently prohibited at the Site. The results of this evaluation indicated that the potential vapor migration from groundwater would not result in an unacceptable risk.

SCOPE AND ROLE OF THE ACTION

EPA's proposed cleanup plan described in this document is intended to fully address the threats to human health and the environment posed by the conditions at this Site. The purpose of this response action is to implement a site-wide strategy for preventing or minimizing further exposure to contaminated soils and groundwater impacted by the closed MSWL and the former Aqua-Tech operations. This will be the final action for remediating the Site and returning groundwater to its expected beneficial use.

HUMAN HEALTH RISK ASSESSMENT APPROACH

As part of the RI/FS, a **Baseline Risk Assessment (BRA)** was conducted to evaluate current and future effects of contaminants on human health and the environment. Chemicals detected on-Site were evaluated according to their potential to produce either cancer and/or non-cancer health effects. The carcinogenic risk range EPA has set for Superfund cleanups to be protective of human health is 1×10^{-4} to 1×10^{-6}. For example, a cancer risk of 1×10^{-4} indicates that an individual has a 1 in 10,000 or 1 in 1,000,000 for 1×10^{-6} incremental chance of developing cancer as a result of site-related exposure to a carcinogen over a 70 year lifetime under the specific exposure conditions at the site. EPA generally uses the cumulative benchmark risk level of 1×10^{-4} for all exposures relating to a particular receptor to trigger action for site media (soil, groundwater, etc.). In other words, a carcinogenic risk greater than 1×10^{-4} for soil would indicate that remedial action for soil is necessary.

Non-cancer exposure estimates were developed using EPA references dose to calculate a **Hazard Index (HI)**. A HI greater than 1 indicates that constituents are present at concentrations that are above EPA's acceptable dose level. CERCLA guidance indicates that a cancer risk of 1 x 10^{-6} and an HI of 1.0 should be used as the point of departure when considering acceptable risk levels for a site. EPA may base cleanup levels on a cancer risk level as high as $1x10^{-4}$, for the Aqua-Tech Site. However, EPA is selecting cleanup levels based on a more conservative cancer risk level of $1x10^{-6}$. Actual or threatened releases of hazardous substances from this Site, if not addressed by the Preferred Alternative or one of the other active measures considered, may present a current or potential threat to public health, welfare, or the environment.

WHAT IS RISK AND HOW IS IT CALCULATED?

A Superfund human health risk assessment estimates the "baseline risk." This is an estimate that the likelihood of health problems could potentially occur if no cleanup action were taken at a site. To estimate the baseline risk at a Superfund site, EPA undertakes a four-step process:

Step 1: Analyze Contamination
Step 2: Estimate Exposure
Step 3: Characterize Site Risk
Step 4: Summarize Site Risk

In Step 1, EPA looks at the concentrations of contaminants found at a site as well as past scientific studies on the effects these contaminants have had on people (or animals, when human studies are unavailable). Comparisons between site-specific concentrations and concentrations determined to be safe based on toxicity studies helps EPA to determine which contaminants are most likely to pose the greatest threat to human health.

In Step 2, EPA considers the different ways that people might be exposed to the contaminants identified in Step 1, the concentrations that people might be exposed to, and the potential frequency and duration of exposure. Using this information, EPA calculates a "**reasonable maximum exposure" (RME)** scenario, which portrays the highest level of human exposure that could reasonably be expected to occur.

In Step 3, EPA uses the information from Step 2 combined with information on the toxicity of each chemical to assess potential health risks. EPA considers two types of risk: cancer risk and non-cancer risk. The likelihood of any kind of cancer resulting from a Superfund site is generally expressed as an upper bound probability; for example, a "1 in 10,000 chance." In other words, for every 10,000 people that could be exposed, one extra cancer *may* occur as a result of exposure to site contaminants. An extra cancer case means that one more person could get cancer than would normally be expected to from all other causes. For non-cancer health effects, EPA calculates a "hazard index." The key concept here is that a "threshold level" (measured usually as a hazard index of less than 1) exists below which non-cancer health effects are no not expected to occur.

In Step 4, EPA determines whether site risks are great enough to cause concern based on potential health problems for people at or near the Superfund site. The results of the three previous steps are combined, evaluated and summarized. EPA adds up the potential risks

SUMMARY OF HUMAN HEALTH RISKS FROM THIS SITE

In evaluating the current land use (abandoned), the BRA considered the risks from Site contaminants on a site visitor/trespasser. This part of the BRA examined surface soil, sediment, surface water and air as the primary sources of exposure. The exposure pathways included dermal contact of surface soils, sediments and surface water; ingestion of surface soils, sediments; and surface water and inhalation of air (landfill gas). The BRA found no unacceptable risk for the current site visitor/trespasser scenario.

In developing the risk assessment for future exposures, the BRA considered the future use of the Site. The Site is located within the "Airport Environs Area" as defined by the *Greenville - Spartanburg Airport Environs Area zoning Ordinance, dated March 29, 1996* which precludes residential development of the Site. Therefore, cleanup levels for

all media of concern at the Site (excluding groundwater) were based on future commercial/industrial use. However, for completeness of the BRA, the BRA assessed both the future residential and commercial/industrial land use scenarios. Groundwater ingestion may not be a likely exposure pathway since groundwater at the Site is not currently used for consumption. However, since SCDHEC classifies all groundwater as a potential source of drinking water, the shallow groundwater beneath Site was conservatively assumed to be a source of drinking water.

Exposure pathways evaluated for the future child and adult residents; and for the future commercial, construction and irrigation workers included dermal contact of surface soils, sediments and surface water; incidental ingestion of surface soils, sediments, surface water and groundwater; and inhalation of air (landfill gas). A summary of the findings of the BRA are as follows:

- The residential scenarios assumed that residences would be built on the Site and wells would be drilled for drinking water purposes. The BRA found that an unacceptable risk exists for the future residential scenario.

- There is no unacceptable cancer risk exists for the future commercial worker scenario.

- There is an unacceptable noncancer risk for the future construction worker scenario.

- The is no unacceptable risk for the future irrigation worker scenario.

- In general, the BRA found the summed carcinogenic risk associated with exposure to ingestion of groundwater and soil and dermal contact of surface soils and inhalation of air (landfill gas) exceeds EPA's acceptable risk range (10^{4} to10^{-6}). One example, under the future residential scenario, exposure primarily through ingestion of Site groundwater poses an unacceptable estimated cancer risk of 5.0×10^{-3}. This cancer risk exceeds EPA's acceptable risk range. Therefore, if the Site is used for residential development, unacceptable risks would be posed to the resident.

- Furthermore, the BRA summed non-carcinogenic hazard associated with exposure to ingestion of Site groundwater and soil and dermal contact of surface soils and inhalation of air (landfill gas) exceeds EPA's target HI of 1. One example, under the future residential scenario, exposure primarily through ingestion of groundwater results in an estimated HI of 175. This non-cancer risk exceeds the target HI of 1. Therefore, if the Site is used for residential development, unacceptable risks would be posed to those residents.

- Several metals and VOCs in groundwater and soil contribute most significantly to the overall cancer and non-cancer (HI) risks. For the air one VOC, benzene contributes an unacceptable cancer risk. The primary contaminants of concern for surface soil are Iron, Lead and Mercury. The primary contaminants of concern in subsurface soils are Aroclor 1242, Iron, Thallium and Trichloroethene. Most of these are located within the limits of the closed MSWL. The primary COCs in the groundwater are 1,1,2,2 - Tetrachloroethene, 1,1-Dichloroethene, Benzene, cis-1,2-Dichloroethene, Tetrachloroethene, Trichloroethene and Vinyl Chloride. The primary COC in air is benzene.

- Several metals were found in sediments. However, analyses performed provide strong evidence that the metal concentrations detected in sediments, as well as soils, reflect naturally-occurring concentrations.

ECOLOGICAL RISKS

The ecological risk assessment (ERA) performed for the Site led to the following conclusions:

- There were no **chemicals of potential concern(COPC)** in the surface water and sediments.

- The maximum concentrations of several metals in soils exceeded their conservative screening levels, indicating the potential for unacceptable ecological risk.

REMEDIAL ACTION OBJECTIVES

The results of the BRA performed during the RI indicated that only soil and groundwater warrant remedial action as the presence of contaminants, in these media, may present an unacceptable risk to human health under specific exposure scenarios. Active remedial alternatives being considered for soil and/or groundwater will further reduce chemical concentrations in the ambient air, if any, attributable to the Site.

Based on the results of the RI, BRA and ERA the following remedial action objectives for the Site have been established:

- to prevent or mitigate to the maximum extent practicable, direct human exposure to Site soils and/or the MSWL contents.

- to prevent exposure of human receptors to contaminated groundwater containing contaminant levels above State and Federal **maximum contaminant levels (MCLs)** established under the **Safe Drinking Water Act**.

- to restore contaminated groundwater located outside of the closed MSWL to drinking water standards and risk-based levels within a reasonable time frame.

- to control migration of contaminants from the Site to surface water by eliminating contact of stormwater runoff with MSWL contents and contaminated surface soil; and

- to monitor the groundwater and soil in a manner to verify the effectiveness of the remedial actions

Soil

This proposed action will reduce the human risk associated with exposure to contaminated soil to an excess cancer risk of $1x10^{-6}$ or (one in one million) or a hazard quotient of 1. This will be achieved by reducing the concentrations of the soil contaminants to the following target levels:

Lead	598 mg/kg
Arclor 1242	9 mg/kg
Mercury	73 mg/kg
Thallium	35 mg/kg
Trichloroethene	54 mg/kg

Because there are no Federal or State cleanup standards for soil contamination, EPA established these targets, or Remedial Goals (RGs), based on the Site baseline risk assessment. Targets were selected that would both reduce the risk associated with site worker exposure to soil contaminants to an acceptable level, and ensure minimal migration of contaminants into the ground water. Iron was eliminated as a contaminant of concern for soils because the maximum detected concentration for Iron was 56,300 mg/kg which was below the target level of 137,000 mg/kg.

Groundwater

This proposed action will reduce the human risk associated with exposure to contaminated groundwater. This will be achieved by reducing the concentrations of the groundwater contaminants of concern to the following target levels:

1,1,2,2-Tetrachloroethane	2 ug/L
1,1-Dichlorothene	7 ug/L
Benzene	5 ug/L
cis-1,2-Dichloroethene	70 ug/L
Tetrachloroethene	5 ug/L
Trichloroethene	5 ug/L
Vinyl Chloride	2 ug/L

The Remedial Goals or target levels for groundwater contaminants of concern are based on the MCL established under the Safe Drinking Water Act or risked-based levels.

Air

Although benzene is the primary COC for air, a target level for benzene was not calculated since the air itself cannot reasonably be remediated. However, all of the modeled air concentrations were less than the current SMAACs. Furthermore, active remedial alternatives being considered for soil and/or groundwater will further reduce chemical concentrations in the ambient air at the Site.

SUMMARY OF REMEDIAL ALTERNATIVES

The following alternatives are grouped into three categories which include soil/groundwater alternatives, soil alternatives, and groundwater alternatives. Remedial alternatives for the Site are presented in the following summary table. The alternatives are numbered to correspond with the numbers in the FS report. Routine groundwater monitoring will be a component of any remedy selected with the exception of the "No Action" alternative. Costs for monitoring required over and above the routine monitoring (such as would be required for Monitored Natural Attenuation or chemical injection) are included in the appropriate alternative.

Alternatives G3 and G4 for groundwater treatment, are evaluated as independent alternatives, however, it is anticipated that they would be combined with one of soil alternatives to address all impacted media at the Site.

Summary of Alternatives

Medium	FS Designation	Description	Cost
Soil/Groundwater	S1/G1	No Action	$ 62,000
	S2/G2	Institutional Controls	$ 810,000
Soil	S3	Site Capping	
	S3A	RCRA Subtitle D Cover	$ 1,649,000
	S3B	RCRA Subtitle C Cover	$ 5,202,000
	S3C	Mixed Cover/Cap	$ 2,842,000
	S4	Site Capping and In-Situ Soil Treatment	$ 3,355,000
Groundwater	G3	Chemical Injection	$ 508,000
	G4	Monitored Natural Attenuation	$ 340,000

GROUNDWATER/SOIL ALTERNATIVES

Alternative S1/G1 - No Action
Estimated Capital Cost:$0
Estimated Annual Operation and Maintenance (O&M) Cost: $5,000
Estimated Present Worth Cost:$62,000
Estimated Time To Completion: None
Satisfaction of Remedial Action Objectives: No

The No Action alternative is considered a baseline against which other alternatives are compared. With the No Action alternative, no remedial actions will be performed to actively reduce mobility, toxicity, or volume of the chemicals of concern found in the groundwater and associated soil. Under this alternative, no changes would be made to existing site conditions or exposure scenarios. NCP-required five year monitoring costs are associated with this alternative. Present worth analysis are based on

review once every five years for 30 years. This alternative relies on **natural attenuation** and degradation and leaching for the reduction of the chemicals of concern in the Site soils and groundwater. Natural degradation is the tendency of the chemicals to reduce through physical, chemical and biological processes in the natural environment. Attenuation is the tendency of a chemical to bind to in situ soil particles or organic matter resulting in a reduction of the chemical's mobility. The leaching process relies on infiltration or groundwater flow to

desorb chemicals in the soil.

Alternative S2/G2 - Institutional Controls and Monitoring
Estimated Capital Cost: $100,000
Estimated Annual O&M Cost: $57,000
Estimated Present Worth Cost:$810,000
Estimated Time To Completion: ≥ 2 years
Satisfaction of Remedial Action Objectives: Some

(Note: This cost value is considered conservative since annual monitoring costs are expected to decrease in future years after the well network and analyte list is reduced).

Institutional controls would limit the exposure pathways to soils and groundwater potentially containing contaminants of concern. Institutional controls may involve deed restrictions, well permitting requirements, zoning controls and access restrictions, and would mitigate the potential risk to human health by restricting the potential exposure pathways. Currently, the Site is zoned commercial/industrial and is located within the "Airport Environs Area" as defined by the Greenville-Spartanburg Airport Environs Area zoning ordinance, dated March 29, 1996. Groundwater monitoring at the Site will be a component of this remedial alternative. Groundwater monitoring would be performed using the existing well network supplemented by a minimum of two new wells. Results of the monitoring program will be used to evaluate the movement of Site related chemicals of concern in the groundwater. Although groundwater monitoring would not reduce the present risk levels, it would provide an early warning for the migration of contaminants from the Site; and a better understanding and evaluation of the natural attenuation mechanisms in effect.

Established procedures and mechanisms already exist to implement institutional controls over the short term, and these means are sustainable over the proposed long term (e.g., a minimum of 30 years).

This alternative partially complies with the remedial action goals by being protective of human health; however, the Institutional Controls alternative does not minimize the volume of untreated contaminants of concern or the continued migration of contaminants.

SOIL ALTERNATIVES

Alternative S3 - Site Capping

Under this remedial alternative, a cover designed in accordance with RCRA Subpart F - Closure and Post-Closure Care, would be constructed over the MSWL to isolate the waste and to reduce infiltration and erosion. The Subpart F cover serves to prevent surface exposure to the environment, and to reduce or minimize infiltration. Three remedial alternatives were developed for covering soil and municipal solid waste (MSW) at the Aqua-Tech Site, and the locations of MSW and chlorinated compounds were considered. The alternatives for covering the waste are organized into three basic options: 3A RCRA Subtitle D Soil Cover; 3B-RCRA Subtitle C Cover, and; 3C Combination Cover. A preliminary determination of the extent of a cover is illustrated on Figure 3.

Alternative S3A - RCRA Subtitle D Cover
Estimated Capital Cost: $1,319,000
Estimated Annual O&M Cost: $22,000
Estimated Present Worth Cost:$1,649,000
Estimated Time To Completion: 18 months
Satisfaction of Remedial Action Objectives: Moderate

Paragraph (a) of RCRA Subpart F defines Subtitle D cover requirements for closure of an inert pre-RCRA MSWL. The cover consists of an infiltration layer that reduces infiltration through the placement of a minimum 10^{-5} cm/second permeability layer of earthen fill material, and an erosion layer that supports vegetative cover and protects the infiltration layer. In general accordance with Subpart F, the infiltration layer is a minimum of 18 inches earthen material, and the erosion layer has a minimum thickness of one foot. There are no specific requirements for drainage slopes, although cover design must account for potential long-term erosion potential, and facilitate long-term maintenance.

Installation of an infiltration layer and protective vegetation erosion layer will be immediately effective in preventing surface contact with waste, however, infiltration will continue, and Alternative S3A is not expected to dramatically reduce percolation through soils and buried MSW when compared to existing Site conditions. Effectiveness in isolation from percolation is moderate, however, mechanisms that serve to reduce contaminant mass in the environment can be sustained. Figure 4 illustrates the cross-sections of a RCRA Subtitle D Cover.

Although the Aqua-Tech Site landfill is relatively old (approximately 30 years), substantial subsidence can occur if a landfill cover remedy is combined with other remedial technologies such as soil vapor extraction or bio-venting. Implementation of Alternative S3A also facilitates the economical repair and maintenance of active remedial systems installed beneath the cover that require penetrations through the cover to ground surface. An example would be maintenance or modification of soil vapor extraction laterals used to actively remove volatile landfill constituents.

Alternative S3B - RCRA Subtitle C Cover

Estimated Capital Cost: $4,448,000
Estimated Annual O&M Cost: $57,500
Estimated Present Worth Cost:$5,202,000
Estimated Time To Completion: 18 months
Satisfaction of Remedial Action Objectives: Moderate

Paragraph (k) of RCRA Subpart F requires that the Subtitle C cover include a gas management layer, an infiltration layer, a flexible membrane liner and associated drainage layer, and a two foot erosion layer. Slope of the final cover must be between 2 percent and 33 percent. The RCRA Subtitle C cover considered in this alternative is consistent with Paragraph (k) but includes 24 inches of compacted clay with a permeability of 10^{-7} cm/second, and a 60 mil High Density Polyethelyne (HDPE) liner. Figure 4 illustrates the cross-sections of a RCRA Subtitle C Cover.

A multi-layer cover that virtually eliminates rain percolation through buried waste is effective in reducing the vertical leaching of landfill constituents. It is also effective in preventing surface exposure to the environment. Overall effectiveness of this alternative is dependent on the buried wastes containing leachable constituents lying above the groundwater so they can be isolated from both vertical or horizontal groundwater flow. Effectiveness of this remedy can be compromised if combined with remedies that promote aerobic conditions in the waste, and hence cause landfill subsidence. As with Alternative S3A, maintenance and repair of a lined cover should be considered if Alternative S3B is combined with remedial technologies such as SVE. A multi-layer cover of this magnitude is expected to be difficult and expensive to repair in the event of waste subsidence. As with Alternative S3A, the potential exists that the impermeable cover will disrupt mechanisms that currently result in the long-term removal of contaminant mass through reductive dechlorination. While an impermeable cover will effectively halt percolation of rain infiltration, the long-term result may be increased groundwater impact down gradient when carbon sources are consumed beneath the cover, and are not replenished via rain infiltration and percolation.

The use of geocomposite materials in the lined landfill offer modern construction alternatives that may reduce costs and replace some of the dependence on accessible and acceptable borrow materials obtainable from nearby sources. This technical approach is not readily adapted to construction on steep ravine slopes.

Alternative S3C - Combination Cover

Estimated Capital Cost: $2,346,000
Estimated Annual O&M Cost: $40,000
Estimated Present Worth Cost:$2,842,000
Estimated Time To Completion: 18 months
Satisfaction of Remedial Action Objectives: Moderate

Note: A combination of Alternative S3A (73% Coverage) and Alternative S3B (27% Coverage)

This alternative consists of utilizing an impermeable liner with associated gas and drainage layers in areas

of the Site where halting all infiltration is desirable regardless of the impact on current active reductive dechlorination processes consistent with the approach

described in Alternative S3B. Other areas of the Site would be covered in accordance with Paragraph (a) of Subpart F, consistent with the approach described in Alternative S3A. Alternative S3C is designed to allow impermeable capping of areas of the Site that have been shown to have elevated chlorinated ethenes in soil, MSW, or groundwater, while using soil cover for areas of the Site that present little or no potential groundwater impact threat.

This alternative is effective in preventing surface exposure to the environment, and is effective in reducing or halting rain infiltration and percolation in areas where the liner is present. If sustained reductive dechlorination is desirable in areas where chlorinated ethenes are present in groundwater, then this alternative presents overall effectiveness limitations as described in Alternative S3B. There appears to be limited practical reasons to halt percolation through areas of the Site where there is no evidence of chlorinated ethenes, so Alternative S3C offers a combination of cover systems that compromises between the lower cost of Alternative
S3A, while retaining the greater isolation characteristics of Alternative S3B. Combining and joining the lined cover with unlined cover is easily implemented and presents no serious technical construction difficulty.

Alternative S4 - Site Capping and In Situ Soil Treatment

Estimated Capital Cost: $2,736,000
Estimated Annual O&M Cost: $40,000(landfill cap) +$30,000(In Situ Soil Treatment System)
Estimated Present Worth Cost:$3,355,000
Estimated Time To Completion: 18 months for cover, 5 years for Soil Vapor Extraction (SVE)
Satisfaction of Remedial Action Objectives: High (Primarily soil)

Note: Estimated costs for Alternative S4 were developed on the assumption that it would be implemented in conjunction with Alternative S3C.

This alternative combines isolation of soil and MSW through construction of a soil or RCRA cover, with a mechanical SVE system to aggressively pursue the removal of chlorinated compounds in soils above the MSW in the former Process Distillation Area at the Site. It is anticipated that the SVE collection network would replace the layer for passive gas collection. This alternative offers the advantage of physical removal of the chlorinated compounds and therefore is preferred over remedies that only isolate or cover volatile contaminants in the soil. In areas of the Site where it is unlikely that short-circuiting of airflow will occur, horizontal soil vapor collection lines would be trenched into the soil above the MSW deposits using a vibratory trencher. No excavation or soil removal would be used in the installation of these laterals.

If SVE is combined with Alternative S3A - RCRA Subtitle D Soil Cover, then it may be desirable to install a lower permeability clay layer (i.e.: 10^{-6} or 10^{-7} cm/second) and also to install a drainage layer above the clay to prevent excess water accumulation in the treatment system. If a geocomposite drainage layer is used in the final Remedial Design, then a flexible membrane liner can be incorporated into the geocomposite and ensure optimum SVE conditions.

Potential subsidence of waste as a result of composting of wood debris in the MSW could cause problems in cover integrity, particularly in the geosynthetics and flexible membrane liner. Two solutions are 1) to measure small temperature increases resulting from the in situ oxidation process; and 2) to periodically survey inert points on the barrier cover placed throughout the waste cover that penetrate to the surface providing surface detection of interior layer movement.

Alternative S4 retains the effectiveness offered by Alternative S3 plus the added benefit of reducing the contaminant mass in the soils.

GROUNDWATER ALTERNATIVES

Alternative G3 - CHEMICAL INJECTION

Estimated Capital Cost: $508,000
Estimated Annual O&M Cost: $0
Estimated Present Worth Cost:$508,000
Estimated Time to Completion: 3 - 5 years
Satisfaction of Remedial Action Objectives: High (Primarily Groundwater)

Note: Includes 6 injections over a three year period.

Note: The costs for this alternative include initial treatability studies, permitting, injection events, interim monitoring between injection events, and on-going performance assessments. It is anticipated that initial baseline and/or interim monitoring events will be scheduled to coincide with annual sampling events. Interim sampling events will focus on specific treatment areas and will not incorporate the entire well network. In addition, interim monitoring events will utilize a shortened analyte list (VOCs and selected metals).

Chemical injection involves thoroughly permeating contaminated zones with a chemical oxidant or reductant (potassium permanganate, sodium lactate, hydrogen peroxide, ozone, etc.) to induce oxidation-reduction (redox) reactions resulting in the complete destruction of chemical concentrations. The injectant can be placed as a slurry or as a reactive barrier wall.

The main limitation on treatment effectiveness at the Site will be the low permeability of the soils. The chemical application method can be modified as needed to utilize hydraulic fracturing and liquid atomized injection to improve delivery to the subsurface. If long term permeability enhancement is desired, coarse sand can also be co-injected to leave the pore spaces open after the fracturing is completed.

Chemical injection would be effective at reducing the concentrations of COCs in groundwater. This technology would provide significant reduction through destruction, rather than through transferring them to other media such as air or carbon matrices. Therefore, this technology would also be affective at reducing the toxicity of contaminants at the Site. Treatability studies would be required during design to determine the optimum chemical(s) to be used, number of injection points, and volume of injectant.

Alternative G4 - Monitored Natural Attenuation

Estimated Capital Cost: $40,000
Estimated Annual O&M Cost: $60,000 (for 5 years)
Estimated Present Worth Cost:$340,000
Estimated Time to Completion: 15 - 30 years
Satisfaction of Remedial Action Objectives: Long-Term

Note: Initial monitoring frequency would be increased to semi-annual. Additional sampling, modeling and data management requirements would result in an approximately 30 to 50 percent increase over Alternative G2 groundwater monitoring costs if implemented with no other groundwater remedy.

Monitored Natural Attenuation is the monitored use of the natural processes of intrinsic bioremediation, advection, dispersion, and sorption to remove contaminants from groundwater. It requires a structured program of groundwater monitoring of biological and chemical parameters to determine that the transformation processes are taking place at a rate that is protective of human health and the environment, and that the processes will continue at an acceptable rate for an extended period of time. Because engineering controls are not used to control plume migration, it is necessary to ensure that natural attenuation is appropriate to address all contaminants of concern in the groundwater.

The majority of source material for the detected Volatile Organic Compounds (VOCs) was removed during the remedial activities performed in 1992, as evidenced by the Site-wide drop in total VOC concentrations in groundwater. The landfill area does not appear to be a significant source of VOCs, and free product does not appear to be present at the Site. The extent of the contaminant plume appears to be stable and is not migrating. The use of natural attenuation does not rely upon cross-media transfer of contaminants (i.e., sorption), and would be protective of human health and the environment.

The rate of attenuation at each monitoring well location varies suggesting that bioattenuation rates are

not sufficient to utilize natural attenuation as the sole remedial action Site-wide. Historical groundwater sampling data suggests that the landfill serves as a significant carbon source for natural attenuation. As a result, placement of a low-permeability cap over the old municipal landfill, effecting a reduction in leachate production, could potentially initiate renewed migration of the contaminant plume after the rate of bioattenuation decreases due to reduction of the carbon source. Use of natural attenuation will be a long-term application, because of the present inability to reduce concentrations (reduction rate lower than source contribution) of all contaminants in all areas.

EVALUATION OF ALTERNATIVES

Each remedial alternative was evaluated according to the nine criteria described below and summarized on the next page. A detailed comparison of each alternative according to these criteria can be found in the FS.

Summary of Evaluation Criteria	
How Evaluation Criteria are Used In selecting a preferred cleanup alternative, the EPA uses the criteria presented here. The first two must be met before an alternative is considered further. The next five are used to further evaluate options. The final two are then used to evaluate the remaining options after comments have been received from the community and the state.	**Overall Protectiveness of Human Health and the Environment** determines whether an alternative eliminates, reduces, or controls threats to public health and the environment through institutional controls, engineering controls, or treatment.
	Compliance with ARARs evaluates whether the alternative meets Federal and State environmental statutes, regulations, and other requirements that pertain to the site, or whether a waiver is justified.
	Long-term Effectiveness and Permanence considers the ability of an alternative to maintain protection of human health and the environment over time.
	Reduction of Toxicity, Mobility, or Volume of Contaminants through Treatment evaluates an alternative's use of treatment to reduce the harmful effects of principal contaminants, their ability to move in the environment, and the amount of contamination present.
	Short-term Effectiveness considers the length of time needed to implement an alternative and the risks the alternative poses to workers, residents, and the environment during implementation.
	Implementability considers the technical and administrative feasibility of implementing the alternative, including factors such as the relative availability of goods and services.
	Cost includes estimated capital and annual operations and maintenance costs, as well as present worth cost. Present worth cost is the total cost of an alternative over time in terms of today's dollar value. Cost estimates are expected to be accurate within a range of +50 to -30 percent.
	State/Support Agency Acceptance considers whether the State agrees with EPA's analyses and recommendations, as described in the RI/FS and Proposed Plan.
	Community Acceptance considers whether the local community agrees with EPA's analyses and preferred alternative. Comments received on the Proposed Plan are an important indicator of community acceptance.

Overall Protection of Human Health and the Environment

Alternative S1/G1 - No Action does not change the current or potential future risks to human health or the environment identified in the RI, BRA or ERA. All 4 remaining Alternatives provide varying degrees of protection.

Alternative S2/G2 - Institutional Controls will provide protection for specific future human exposure scenarios identified at the Site.

Alternative S3 - Site capping will address various direct exposure risks identified in the RI, BRA and ERA. No individual Alternative is completely protective of human health and the environment

relative to all media. Alternatives S2 and S4 collectively address risks represented by contaminated soil at the Site. Alternatives G2 and G3 address current and potential future risks associated

with groundwater.

Compliance with ARARs

Alternatives S1/G1 and S2/G2 do not comply with various ARARs identified for the Site. Alternative S3 must be incorporated into the final remedy to comply with current South Carolina municipal landfill closure requirements. The natural attenuation processes at the Site are quite variable from location to location. Therefore, there is no assurance that Alternative G4 would universally comply with ARARs or remedial goal objectives within a reasonable time period. Alternatives S4 and G3 reduce the time required for the Site to comply with media specific ARARs. However, media related ARARs do not specifically apply to contaminant concentrations within media situated beneath the limits of the landfill cover.

Long-Term Effectiveness and Permanence

Alternative S1/G1 does not provide a permanent remedy or actively reduce long-term risks. Institutional Controls provided in Alternative S2/G2 will be effective in mitigating specific long-term exposure risks provided they are enforced. Failure to enforce Institutional Controls may impact the long-term effectiveness and permanence of any Alternative that is chosen. Long-term groundwater monitoring included in Alternative S2 will evaluate the effectiveness of natural attenuation mechanisms at the Site if implemented with no other action or will serve to monitor the long-term effectiveness of any other remedy selected for implementation.

The various Site caps offered under Alternative S3 are equally effective for their intended purpose. Alternative S3B is considered the most permanent Alternative due to the thickness of the layers and redundancy inherent in the design (i.e.: if the synthetic liner fails the clay barrier still restricts infiltration). The effectiveness and permanence of each Alternative is dependent on long-term maintenance of the surface.

Combined Alternatives S4 and G3 provide the greatest level of permanence and long-term effectiveness through the permanent reduction in contaminant mass in soil (Alternative S4) and groundwater (Alternative G3). It is anticipated the implementation of both Alternatives will be complete within 5 years. However, the short duration of the implementation results in a permanent and long-term reduction of risk at the Site.

Reduction of Toxicity, Mobility or Volume

Alternatives S1/G1, S2/G2 and G4 provide no reduction in toxicity, mobility or volume other than what will be reduced by natural attenuation and degradation processes. Although natural attenuation processes may be effective in reducing some contaminant concentrations, they are unlikely to achieve all chemical specific ARARs in a reasonable time frame.

Alternative S3 will reduce the mobility of certain contaminants by reducing or eliminating infiltration of precipitation and thereby reduce the leaching potential of leachable constituents. Alternative S3B provides the greatest level of protection from leaching and would therefore be appropriate for areas where residual contaminant sources remain a direct threat to groundwater. This alternative will not reduce the toxicity or volume of contaminants at the Site. Alternatives S4 and G3 will both reduce contaminant volumes and toxicity. Alternative S4 includes an SVE component that will reduce the concentrations of VOCs in the soil. Alternative G3, Chemical Injection will treat contaminants in soil and groundwater through chemical degradation and/or by enhancing natural biodegradation mechanisms.

Short-Term Effectiveness

None of the Alternatives considered pose any substantive incremental increased risks to the community, the workers or the environment in the short-term during implementation.

Alternative S3 involves the risks inherent in moving substantial volumes of clean soil through portions of the community. However, potential exposure to contaminated media will be limited and can be controlled through proper design.
Alternative S4 retains the risks of Alternative S3 plus added potential exposure to VOCs during installation of the SVE system. The exposure to VOCs or potential releases of VOCs during system installation is readily managed through monitoring and engineering controls.

Alternative G3, Chemical Injection, has some inherent incremental risks due to the need to handle and inject chemicals into the subsurface. Potential exposure risks are limited and would be further mitigated through proper handling of the chemicals and monitoring during injection.

Implementability

All 5 Alternatives can be readily implemented and are based on demonstrated technologies. Alternative S3 provides various implementation challenges due to the volumes of materials to be imported to the Site and the presence of steep side slopes around the southeastern and southern limits of the MSWL. The construction challenges will be addressed during the RD stage.

Cost

The estimated costs for the remedial alternatives range from $62,000 (No Action) to $5,202,000 (RCRA Subtitle C Cap).

Each Alternative is focused on a different target or media and therefore a direct comparison of costs between major Alternative groups is not appropriate.

Cost comparisons between capping options under Alternative S3 are appropriate with the capping estimates ranging from $1,592,000 for a RCRA Subtitle D soil cover to $5,202,000 for a RCRA Subtitle C cover. As noted, the RCRA Subtitle C cap costs over 3 times more than the standard soil cover and therefore should only be considered in areas that warrant the additional level of protection provided by the RCRA cap.

State Agency Acceptance

SCDHEC has reviewed this Proposed Plan and concurs with the Preferred Alternative.

Community Acceptance

Community Acceptance of the Preferred Alternative will be evaluated after the public comment period ends and will be described in the Record of Decision for the Site.

SUMMARY OF THE PREFERRED ALTERNATIVE

Remedial Alternative S1/G1 was omitted from consideration due to its inability to reduce the toxicity, volume or mobility of Site contaminants in a reasonable time.

Remedial Alternative S2/G2 - Institutional Controls, will be incorporated into the preferred remedy to restrict access to the Site during implementation of remedial action, restrict long-term use of the Site to protect remedial measures and provide long-term inspections and monitoring. Once implemented, the preferred remedy will not rely on access restrictions (fencing) to maintain protection of public health.

Remedial Alternative S3 effectively isolates residual soil contamination but does not reduce the toxicity or mass of contaminants and does not fully address groundwater impacts from historic Aqua-Tech operations if implemented on its own.

Remedial Alternative S4 incorporates the capping benefits of Alternative S3 and provides for further reduction of contaminant toxicity and mobility through focused soil treatment but does not specifically impact groundwater quality in the short term. Alternative G3 provides accelerated treatment of groundwater through chemical oxidation. Alternative G4 will not provide accelerated treatment of groundwater. However, Alternative G4, Monitored Natural Attenuation, may provide long-term remediation of residual groundwater contamination remaining after accelerated treatment (i.e. Alternative G3). A combination of focused soil and groundwater treatment actions provides the greatest level of protection without redundancy. Consequently, the preferred remedial alternative will combine elements of Remedial Alternatives S2/G2, S4 and G3. The primary remedial activities will consist of the following:

1) Routine groundwater monitoring and Site inspections to assess the effectiveness and integrity of the selected remedial alternative;

2) Institutional Controls to restrict use and development of the Site to minimize public exposure to residual contaminants, and to ensure the long-term integrity of the remedy;

3) Site Capping using a combination of a RCRA Subtitle C Cover and RCRA Subtitle D soil cover for different portions of the municipal landfill to ensure all municipal waste is isolated from exposure and provide an extra level of protection in areas where the greatest concentrations of VOCs were reported;

4) In situ Soil Treatment in the former Process Distillation Area to reduce the mass of VOCs in shallow soils throughout this area; and

5) In situ Groundwater Treatment by chemical injection to immediately reduce the contaminant mass and enhance the long term biodegradation of residual VOCs in groundwater. Once in situ-treatment is complete, final remediation of groundwater will be achieved through natural attenuation.

The primary elements of the preferred remedy are illustrated on Figure 4.

EPA's PROPOSED CLEANUP PLAN FOR THE AQUA-TECH ENVIRONMENTAL SITE

Medium	FS Designation	Description	Total Present Worth
Soil/Groundwater	S2/G2	Institutional Controls/monitoring	$ 810,000
Soil	S4	Site Capping and In-Situ Soil Treatment	$ 3,355,000
Groundwater	G3	Chemical Injection	$ 508,000
			$ 4,673,000

COMMUNITY PARTICIPATION

EPA and SCDHEC provide information regarding the cleanup of the Aqua-Tech Environmental Site to the public through public meetings, the Administrative Record file for the site, and announcements published in the Greenville News. EPA and SCDHEC encourage the public to gain a more comprehensive understanding of the site and the Superfund activities that have been conducted at the site. Dates for the public comment period and the date, location, and time of the public meetings are provided on the front page of this Proposed Plan.

All comments, written and oral, should be directed to Yvonne Jones, Remedial Project Manager for the Site, at the address, telephone number, or EMAIL address provided below. Upon timely request, EPA will extend the public comment period by 30 days. Background and other information on the Aqua-Tech Environmental Site cleanup (including investigation reports and work plans) can be found in the Administrative Record and information repositories established for the public by EPA. These repositories can be visited at the locations below.

ADMINISTRATIVE RECORD AND INFORMATION REPOSITORIES

Middle Tyger Branch Library
170 Groce Road
Lyman, SC 29365
(864) 439-4759

U.S. EPA Region 4 Records Center
Attn: Debbie Jourdan
61 Forsyth Street, SW
Atlanta, GA 30303
(404)568-8862

FOR MORE INFORMATION CONTACT:

Yvonne Jones
Remedial Project Manager
EPA Region 4
Atlanta Federal Center
61 Forsyth Street, SW, Atlanta, GA 30303
(404) 562-8793; 1-800-435-9233
jones.yvonneO@epa.gov

or

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Project Manager
SCDHEC
Bureau of Land & Waste Management
2600 Bull Street, Columbia, SC
(803) 896-4077
wilsonrs@columbia34.dhec.state.sc.us

GLOSSARY

Administrative Order on Consent (AOC) - A negotiated legal agreement between EPA and the PRPs. The AOC is enforceable in a court of law, and AOC activities are overseen by EPA.

Applicable or Relevant and Appropriate Requirements (ARARs) - Cleanup plans selected under CERCLA must comply with other pertinent federal, state, and local environmental laws, or justify a waiver where appropriate. These other laws are collectively referred to as ARARs.

Administrative Record - A file containing all information used by EPA to select a response action under CERCLA. This file must be available for public review and a copy is to be established at or near the Site, usually at the information repository. A duplicate file is maintained in a central location such as a regional EPA and/or state office.

Background Levels - Two types of background levels may exist for chemical substances: concentrations occurring naturally in the environment and concentrations present in the environment due to human-made, non-site sources (e.g., automobiles, industries) .

Baseline Risk Assessment - An evaluation of the potential risk to human health and the environment in the absence of remedial action or cleanup.

Capital Costs - Expenditures required to construct a remedial action. They are exclusive of costs required to operate and maintain the action.

Chemicals of Concern - Those constituents that significantly contribute to a pathway in an exposure scenario for a receptor that either exceeds the cumulative site cancer risk range of 10-4 to 10-6 or exceeds a non-carcinogenic hazard index (HI) of 1.

Chemicals of Potential Concern (COPCs) - Chemicals that are potentially site related and whose data are of sufficient quality for use in the quantitative Risk Assessment after screening. If the detected concentration was less than two times the concentration in average of background samples, the chemical was not retained as a

COPC. Most organic compounds do not occur naturally in environmental media. Both inorganic compounds and organic compounds were compared to published screening concentrations.

Cleanup- Actions taken to deal with a release or threat of release of a hazardous substance that could affect humans and/or the environment.

Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) - A federal law passed in 1980 and modified in 1986 by the Superfund Amendments and Reauthorization Act (SARA). The Act created a trust fund, known as Superfund to investigate and clean up abandoned or uncontrolled hazardous waste sites.

Concentration - The amount of a chemical in a given volume of air, water, or other medium. An example is 15 parts of carbon in a million parts of air.

Contaminant level - A measure of how much of a contaminant is present.

Deed Restriction - A legal document that places restrictions on how a property may be used. Deed restrictions are used to prevent property owners from conducting certain activities (for example, digging into the ground) that may cause them to come into contact with contamination.

Discount Rate (or Real Interest Rate) - The interest rate used in calculating the present value of expected future costs. A real interest rate is an interest rate that has been adjusted to account for the effect of expected or actual inflation. Real interest rates can be approximated by subtracting the expected or actual inflation rate from a nominal interest rate, such as are those that may be found as the published rate on a savings account or a treasury bond. Real interest rates are used to estimate the cost of alternatives so that alternatives over different time periods can be compared. By US EPA's RI/FS policy, a seven-percent discount rate is used for present-worth cost comparisons.

Drinking Water Standards - Regulations applying to public water systems and specifying the maximum contamination levels that, in the judgment of EPA, are required to protect the public welfare.

Ecological Risk Assessment - As part of the RI, this is a phased (multi-part) study to consider whether, and to what

degree, natural ecosystems on and around the site have been affected by site contamination. As with the Baseline Risk Assessment, results from this study are considered in the Feasibility Study.

Environmental Media - Specific environments--air, water, soil--which are the subject of regulatory concern and activities.

Environmental Medium - A major environmental category that surrounds or contacts humans, animals, plants, and other organisms (e.g., surface water, ground water, soil or air) and through which chemicals or pollutants move.

Exposure - Coming into contact with a substance through inhalation, ingestion, or direct contact with the skin; which may be acute (short-term) or chronic (long-term).

Hazard Index (HI) - A summary of HQ values for one pathway, medium, or land use scenario. EPA generally requireds that remedial actions be taken at sites which have a current land use HI, or future use HI, that is greater than 1.0.

Hazard Quotient (HQ) - A ratio of the amount of a chemical taken in, divided by the reference dose which is an intake amount below which no adverse effects are known to occur.

Groundwater - Water found beneath the Earth's surface that fills pores between materials, such as sand, soil, or gravel, or within the fractures of competent rock.

Information Repository - Materials on Superfund and a specific site located conveniently for local residents.

Institutional controls - A legal or administrative action or requirement imposed on a property to limit or prevent property owners or other people from coming into contact with contamination on the property. Institutional controls may be used to supplement a cleanup (by limiting contact with residual contamination). Examples include deed notices, deed restrictions, and long-term site monitoring or site security requirements.

Landfill gas - Gases typically are generated by the decomposition of organic materials in a landfill. The composition, quantity, and generation rates of the gases depend on such factors as refuse quantity and composition, placement characteristics, landfill depth, refuse moisture content, and amount of oxygen present. The principal gases generated (by volume) are carbon dioxide, methane, trace thiols, and occasionally, hydrogen sulfide. Volatile organic

compounds may also be present in landfill gases, particularly at co-disposal facilities.

Maximum Contaminant Levels (MCLs) - The maximum permissible level of a contaminant in water that is delivered to any user of a public water system.

Milligrams per kilogram (mg/kg) - The term mg/kg or milligrams per kilogram, is equivalent to the expression " part per million or ppm." This is a common unit of measure for chemical concentrations in soil. One milligram is 1/1000 of a gram. One gram weighs about the same as a postage stamp, or about 1/28 of an ounce.

Monitored Natural Attenuation - The reliance on natural processes to achieve site-specific remedial objectives within a time that is reasonable, compared to that offered by more active methods. Such processes may include biodegradation; dispersion, dilution; sorption; volatilization, and chemical or biological stabilization, transformation, or destruction of contaminants.

National Contingency Plan (NCP) - Short name for the "National Oil and Hazardous Substances Pollution Contingency Plan," the Federal regulation that implements Superfund Program and other parts of the nation's response to hazardous substances. The NCP is 40 Code of Federal Regulations (CFR) Part 300. It was last revised in 1990 and was published in Volume 55, Number 46 of the Federal Register (pages 8666-8865).

Natural attenuation - The natural breakdown of hazardous substances in the environment. Once released into the environment, many hazardous substances will degrade or be broken down into nonhazardous substances. Natural attenuation processes work without human intervention within the context of a carefully controlled and monitored site cleanup approach to achieve site-specific remedial objectives within a time frame that is reasonable compared to that offered by other methods.

Operation and Maintenance (O&M) Costs - Post-construction costs necessary to ensure continued effectiveness of a remedial action. Includes both short-term O&M and long-term O&M costs. Most O&M costs are estimated on an annual basis.

parts per billion (ppb) - This term is a way of expressing the concentration of a contaminant in a liquid or air. This term is equivalent to the expression " micrograms per Kilogram" one part per billion is equal to one inch in a distance of about sixteen thousand miles (or a penny in ten million dollars), a very small amount.

Pathway - The "route" a hazardous substance takes from its point of release (the "target") to a person, plant or animal (the "receptor"). The pathway can be direct (when the receptor comes to the target) or indirect (when the hazardous substance migrates from the target to the receptor).

Potentially Responsible Parties (PRPs)- This may be an individual, a company or a group of companies who may have contributed to the hazardous conditions at a site. These parties may be held liable for costs of the remedial activities by EPA through CERCLA Laws.

Preferred Alternative - EPA's selected cleanup plan, which is described on the Proposed Plan along with the reasons EPA prefers it to the other possible cleanup plans.

Present Worth or Present Value - This is a method for placing the cost of future expenses in current dollars allowing the cost of alternatives with different O&M periods. The present worth of O&M costs is the amount of money, which, if invested in the current year, would be sufficient to cover all the O&M costs associated with an alternative. The total present worth project is the sum of the capital cost and the present worth O&M cost.

Presumptive Remedy - A standard remedy for a group of similar sites. EPA's term for a Generic Remedy. Presumptive remedies have been developed for municipal landfills, wood treatment facilities, sites with groundwater contamination, and sites contaminated with volatile organic compounds (VOCs).

Proposed Plan - A public participation requirement in which the lead agency summarizes for the public the evaluation of cleanup alternatives, the preferred cleanup strategy, and the rationale for the preference. This document must actively solicit public review nd comment on all alternatives under consideration.

Reasonable Maximum Exposure (RME) - The maximum exposure reasonably expected to occur within a population.

Receptor - The exposed individual relative to the Exposure Pathway considered.

Remedial Design/Remedial Action (RD/RA) - The remedial design (RD) is a plan formulated by either the PRP or EPA or both to provide the appropriate measures to remediate a hazardous waste site. The remedial action (RA) is the actual construction or implementation phase of a Superfund hazardous waste site cleanup that follows the remedial design.

Remedial Investigation/Feasibility Study - Performed at the Site after a site is listed on the National Priorities List (NPL). The remedial investigation (RI) serves as the mechanism for collecting data. The Feasibility Study (FS) is the mechanism for the development, screening and

detailed evaluation of alternative remedial actions. The RI and FS are conducted concurrently; data collected in the RI influence the development of remedial alternatives in the FS, which in turn affect the data needs and scope of treatability studies and additional field investigations.

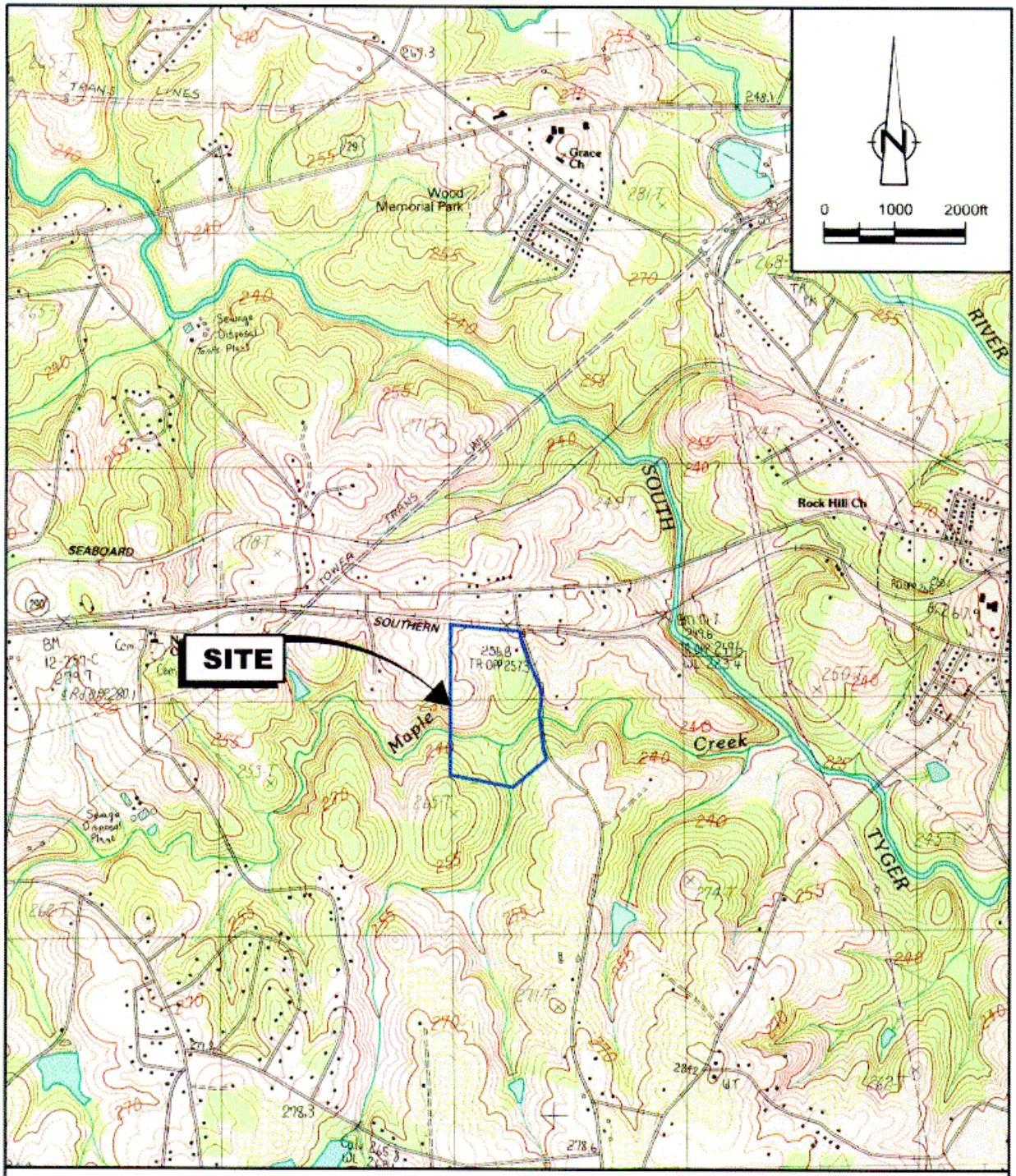
Resource Conservation and Recovery Act - A federal environmental law passed in 1976 and amended in 1984 that established a regulatory system to track hazardous substances from the time of generation to disposal. RCRA specifies treatment, storage, and disposal requirements for hazardous waste that are applicable to cleanup actions under CERCLA.

Safe Drinking Water Act - This act protects the quality of drinking water in the U.S. This law focuses on all waters actually or potentially designed for drinking water use, whether from aboveground or underground sources.

Superfund Amendments and Reauthorization Act (SARA) - Modifications to CERCLA enacted on October 17, 1986.

Semi-volatile Organic Compounds - A group of chemicals composed primarily of carbon and hydrogen that have a tendency to evaporate into the air from water or soil. Some of the compounds that make up asphalt are examples of SVOCs.

Volatile Organic Compounds - A group of chemicals composed primarily of carbon and hydrogen that have a tendency to evaporate (volatilize) into the air from water or soil. VOCs include substances that are contained in common solvents and cleaning fluids. Some VOCs are known to cause cancer.



SOURCE

USGS GREER, SOUTH CAROLINA
QUADRANGLE, PROVISIONAL EDITION 1983.

Figure 1

SITE LOCATION
AQUA-TECH, INC.
Greer, South Carolina

13926-00(008)GN-AT001 MAY 28/2003

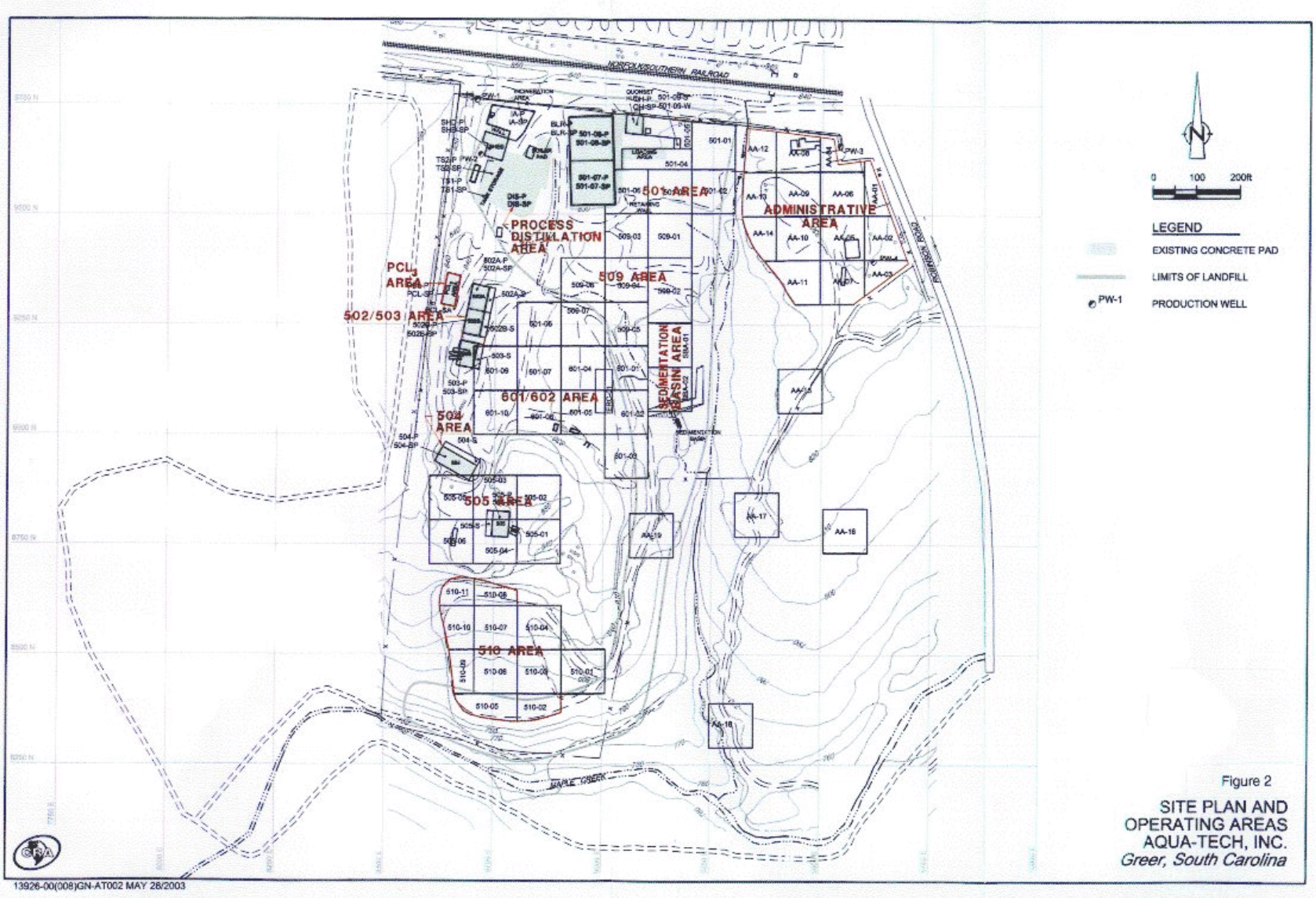


Figure 2

SITE PLAN AND OPERATING AREAS
AQUA-TECH, INC.
Greer, South Carolina

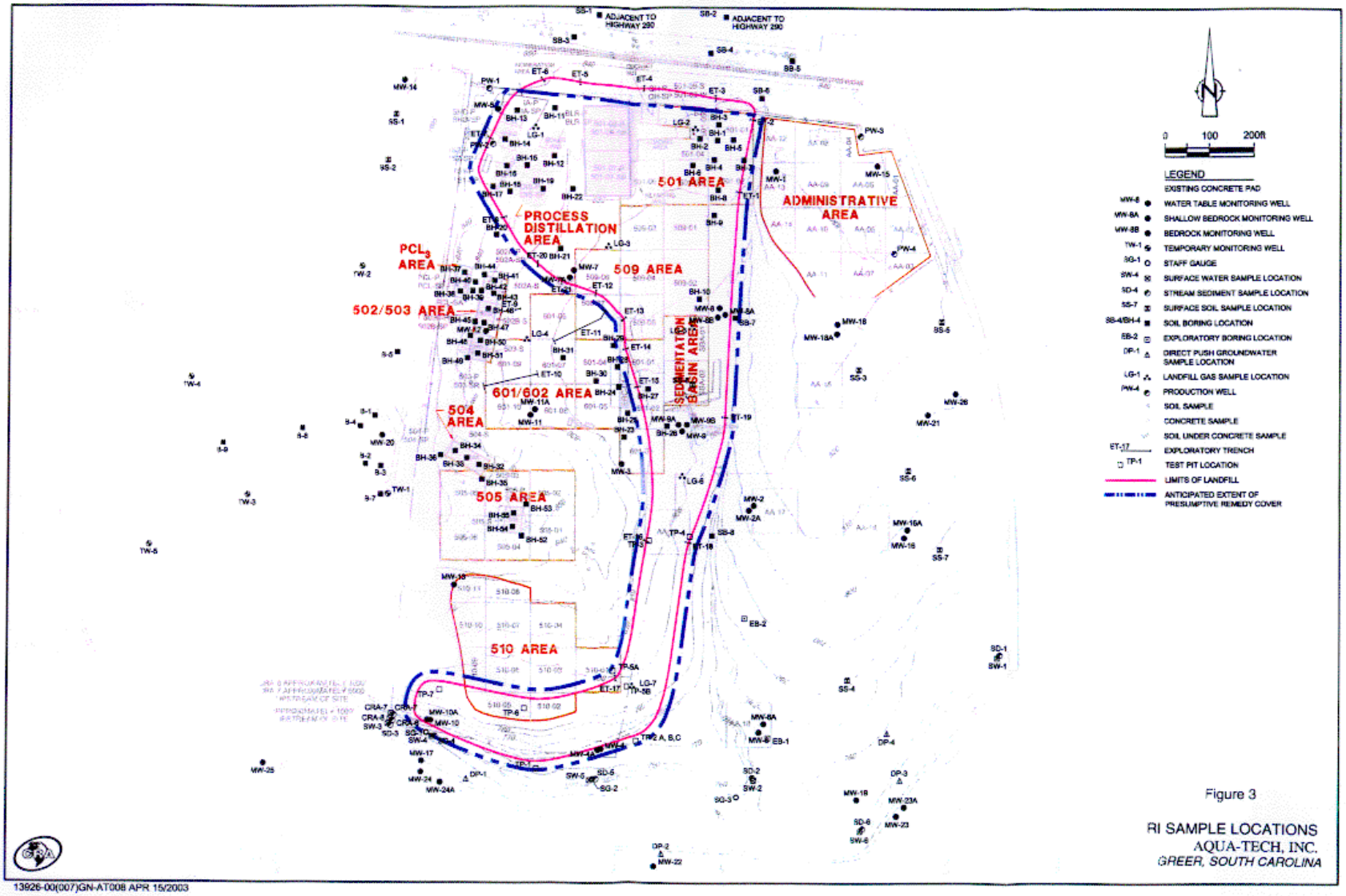
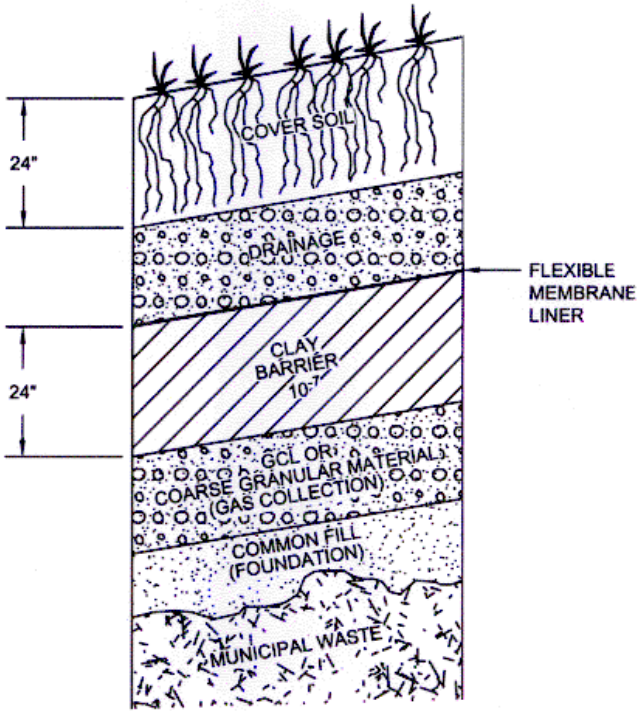


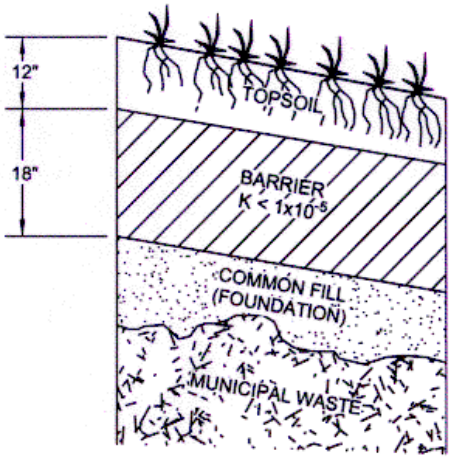
Figure 3

RI SAMPLE LOCATIONS
AQUA-TECH, INC.
GREER, SOUTH CAROLINA

13926-00(007)GN-AT008 APR 15/2003



RCRA SUBTITLE C COVER
NOT TO SCALE



RCRA SUBTITLE D COVER
NOT TO SCALE

Figure 4

TYPICAL COVER
CROSS-SECTIONS
AQUA-TECH, INC.
Greer, South Carolina

13926-00(008)GN-AT007 MAY 30/2003

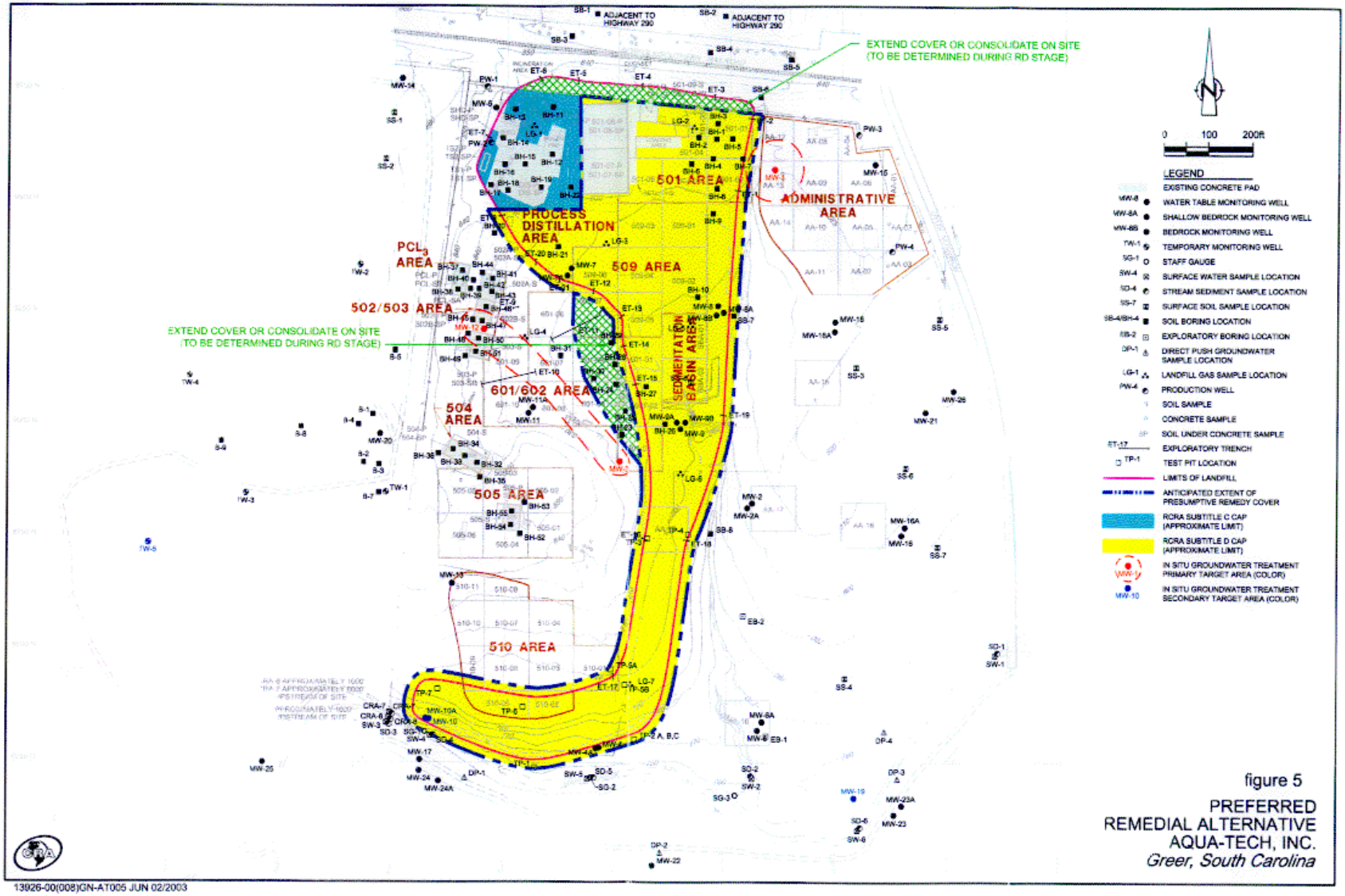


figure 5

PREFERRED REMEDIAL ALTERNATIVE
AQUA-TECH, INC.
Greer, South Carolina

13926-00(008)GN-AT005 JUN 02/2003

USE THIS SPACE TO WRITE YOUR COMMENTS

Your input on the Proposed Cleanup Plan for the Aqua-Tech Environmental Site is important to EPA. The public's comments help EPA select a final cleanup remedy for the site.

You may use the space below to write your comments, then fold and mail. Comments must be postmarked by August 25, 2003. Please contact Yvonne Jones at 404-562-8793 if you have any question about the comment period.

If you have access to E-Mail, you may send comments to: *jones.yvonneo@epa.gov*

Fold on dashed line, staple, stamp and mail.

Name:_____

Address:_____

City:_____State:_____ Zip:_____

Place Stamp Here

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INSIDE: EPA Proposes Action for the Aqua-Tech Environmental Site